

# Forensic Investigation of mass disasters in Nigeria: A review

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## SUMMARY

This paper is to establish the present state of things in the country in terms of legal framework and the availability of personnel with a view to presenting an overview of proper mass disaster investigations. This is a retrospective review of mass disasters in Nigeria that occurred within the last 20 years. The study therefore reviews the state of the forensic investigation of the mass disasters as well as the efforts made to identify the victims of the disaster. The process of proper forensic investigation from the stage of evaluation of the scene and recovery process to the final identification of victims are presented to serve as a protocol for the country. The assessment of the present state of preparedness in Nigeria is also examined with a view to improving the practice to international standards. Data were retrieved from official documents from the aviation industry as well as Nigeria news reports. The standard protocols for disaster victim identification were retrieved from the guide released by the INTERPOL. The state of preparedness of the country and recommendations for improvement are presented. The Federal government and the states of the federation should without further delay put in place the process of reviewing the law of Coroner's system and provide the enabling environment for the proper forensic investigation. The training curriculum of the first responders should incorporate mass disaster investigations in order to produce efficient officers and personnel. A functional disaster victim identification (DVI) team is strongly advocated to incorporate different professionals involved in mass disaster management.

**Key words:** Forensic investigation, identification, mass disaster

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## INTRODUCTION

Mass disasters can be natural or man-made. Man-made disasters are common in Nigeria with poor forensic investigations of the victims. Disaster victim identification (DVI) has literary been non-existent and hence mass burial is the order of the day.

In view of the current understanding of global best practices concerning medico-legal investigation of death resulting from mass disasters, it would appear that Nigeria lags behind. The country also lacks proper and well-

equipped forensic science laboratories to investigate mass disasters and the routine forensic cases closely related to them; there is also a dearth of the relevant personnel of all categories.

Mass disasters generally result in mass casualties usually secondary to catastrophic incidents.<sup>1</sup> A mass disaster can assume a functional definition in a situation where the fatalities outstrip the capacity of the local morgue and available personnel.<sup>1</sup> Its definition, therefore, is both institutional and location based. What may constitute a mass disaster in a cottage hospital may not be so considered in bigger specialist hospital.

Common causes of mass disaster include plane crashes, explosions, collapse of buildings, fire outbreaks, terrorist attacks, train derailments, flooding, stampede at stadia, gas inhalations, genocides, violent riots, amongst others.

Nigeria, the most populous country in Africa has had its own share of mass disaster, especially man-made disaster. The full investigation of these mass disasters

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as well as the forensic identification of the victims has largely been ineffective.

## HISTORY OF MASS DISASTERS IN NIGERIA

In Nigeria, there have been several cases of mass disasters<sup>2</sup> which included the gasoline explosion in Jesse in October 1998, where 500 died and about 100 were wounded; the EAS Airline crash in Kano in May 2002 which recorded 148 deaths; about half of the deceased being those on the ground on the day of incident; the Bellview flight 210 which crashed at Lisa village in October 2005; killing 117 people on board and the Sosoliso Airline crash in Port Harcourt in December 2005, killing about 108 students. Other cases include the pipeline explosion at Ilado village in May 2006, following pipeline vandalisation that left over 200 people dead; the ADC Airline, flight 53, Boeing 737 which crashed in October 2006 after takeoff in Abuja where 96 people died including many medical doctors as well as the then Sultan of Sokoto and only 9 survivors; the pipeline explosion in Abule Egba in December 2006, following vandalism leaving over 100 of charred bodies, most of which were buried at the scene; and the DANA Airline crash of June 2012 where all on board died and rescue mission recovered 152 bodies; there were several bags of body parts and bone fragments. Most recently are the terrorist activities in the Northern part of the country where scores of people are killed almost daily.

## MANAGEMENT OF MASS DISASTERS IN NIGERIA

In all these mass disasters, proper DVI was not carried out except that at Lagos in 2012; there was usually a mass burial and the family members of the victims were left in despair.

In view of the current understanding of global best practices of medico-legal investigation of death resulting from mass disasters, it is obvious that Nigeria is ill-prepared.

In the laws of Nigeria setting up the Accident Investigation Bureau (AIB), the Commissioner for AIB has partly assumed the role of the Coroner and medical examiner in medico-legal investigations of death.

There is no existing mass disaster standing committee charged with the investigation of fatalities; having a comprehensive protocol and regular rehearsals with various other subcommittees.

It is common to observe street urchins and other onlookers invade the scenes of mass disaster to loot and for commuters to obstruct the path of emergency vehicles.

The country also lacks forensic personnel of all categories; proper and well-equipped forensic science laboratories to investigate and manage mass disaster.

## CURRENT INTERNATIONAL MASS DISASTER MANAGEMENT

The unexpected nature of the event and the large number of victims involved generates collective emotional charge. The presence of the emergency investigating teams, law enforcement agencies, journalists amongst others, and the pressure on all concerned, make the multidisciplinary process of identification of the victims a difficult task.<sup>3,4</sup> There has to be an organized procedure which must be managed by well-trained multidisciplinary personnel including the forensic pathologist, criminal police, forensic odontologist and other disciplines essential to the process of identification; the role of the forensic pathologist is pluralist and central.

Identification of victims is one of the most important functions of the DVI team especially the forensic pathologist, odontologist and finger print expert.

The process of identification consists of four phases<sup>4</sup> viz: Recovery of bodies, collection of ante mortem data, examination of bodies and collection of post mortem data and comparison of ante-and post mortem data for reconciliation and identification.

While preparing for the arrival of the DVI team, the site should be secured by the first responder and, as far as possible, everything kept in its original location. An advance team (Head of DVI team, a forensic pathologist and two police officers) should as early as possible be present at the scene to evaluate the situation.<sup>5</sup> It is strongly recommended bodies are not moved until the transport system, receiving area and refrigeration facilities are completed.<sup>4</sup> The disaster site should be overlaid with a grid in order to facilitate search operations. The grid consists of a base line which proceeds from or runs between identifiable fixed points on the ground as well as parallel lines drawn at intervals for instance of 10 m (but depending of the situation), thus forming square sections in which methodical searches can be conducted. To the extent possible, the grid should cover the entire disaster area.<sup>5</sup> Enough stakes, body bags and tags must be available to the recovery teams, who require a grid to enable them record the exact location of bodies and fragments as well as other remains for evidence. Remains and belongings of each victim are placed in the same bag. Parts of remains, objects or evidence are put in separate bags.<sup>4</sup> Photos and written documents on the body, files and forensic medical examination are mandatory. The remains in a body bag and the bag itself must be labeled with the same number.

The collection of ante mortem data is essential. Ante mortem teams must be composed of individuals well trained and experienced in liaising with potential victim's next-of-kin.<sup>4,6</sup> While dental data, DNA and fingerprints are essential to identify the bodies (primary methods of

identification), it is important to take into account such information as medical data and personal belongings (secondary methods of identification).<sup>5,7</sup>

The process of triage of corpses on site allows the identification process to begin more easily with the less mutilated cases. The Interpol DVI Guide recommends that a protocol of post mortem examination must include the following phases<sup>5</sup> radiological examination, external examination including fingerprints and autopsy, dental examination and sampling for DNA investigation.

A post mortem team is composed of a forensic pathologist, two forensic odontologists, an autopsy assistant and a number of police technicians.

The objectives of radiological examination is to give information on the cause, manner and mechanism of death, to search for identification items such as evidence of previous dental treatments (not always in their proper place), jewelry, after effects of diseases, abnormalities and prostheses and to evaluate injuries.<sup>4</sup> Other important reasons is to estimate age, antemortem/postmortem radiological comparison, to look for foreign objects (metallic items, explosive devices, firearms projectiles) and in aircraft accidents, to search for specific characteristic lesions of flight crew members. Radiologic examination of remains is essential for a complete evaluation of an aircraft crash fatality and, for instance, in estimating the position of the pilot at the time of the crash.<sup>7</sup>

External examination is very important for the assessment of injuries, and to search for identifying criteria. Photography is very useful as it complements the chain of evidence and traceability by documenting injuries, trauma and identification items very precisely. Photos should include bodies with and without clothes, jewelry, tattoos, scars, specific features and facial views (front and profile). All the pictures must have a reference body number and a metric scale.<sup>4,5</sup>

The main purpose of the autopsy in DVI operation is to collect post mortem information which could be compared to relevant ante mortem records, but it is not limited to that alone. It is employed, in addition, to elucidate the causes, circumstances and mechanisms of death, and where applicable, to establish the survival time and take advantage of the different investigative techniques to document any lesions or other available evidence.<sup>4,5</sup>

## **AUTOPSY REPORT**

A full autopsy of the body, including opening of the skull, is strongly recommended. It is an indispensable exercise when investigating deaths involving the crew of an airplane or a ship. The autopsy report should mention a description of any lesions, fractures and internal haemorrhages. The

upper airways should be described and the presence or absence of burns and soot with mucus must be documented. Evidence of previous surgical intervention should be documented as with any implants, such as silicone breast implants, pacemakers or orthopaedic material, anatomical peculiarities and pathological features.

There should be systematic sampling for toxicology and genetic information (DNA).

In the examination of human remains, the forensic pathologist will benefit from the assistance of a forensic anthropologist if available.

The teeth are the hardest substances in the human body and, depending upon ambient conditions, characteristics associated to the teeth may provide an important and effective method to identify a person.<sup>8</sup> Teeth can survive in most of the conditions encountered at death and during decomposition, even when the body is exposed to extreme forces and/or temperatures.<sup>8</sup> Forensic comparison of the unique features of the teeth and especially of dental treatments, which are custom made for each patient, have long been recognized as one of the most effective methods of identifying one person to the exclusion of others.<sup>9</sup> This is strictly the responsibility of the forensic odontologist. Dental examination should ideally be performed at the end of the autopsy, taking advantage of the exposure of the relevant parts of the anatomy by the forensic pathologist.<sup>4</sup>

The forensic pathologist must systematically sample from the body and fragmented body parts to obtain material for DNA typing, in case it becomes necessary. DNA degrades after death, so any delay in sampling may result in poor result, particularly in a hot and humid environment. Also the forensic odontologist can extract teeth for DNA analysis according to the norms in cases of complete, decomposed corpse or mutilated remains.<sup>5</sup> The DNA technique allows identification of an individual, distinction between fragments and enables fragments to be assigned to an already identified body. The use of DNA must be planned on a large scale. The laboratories must be capable of working with nuclear DNA, mitochondrial DNA, Y chromosome DNA and the mini-STR.<sup>4</sup>

The identification of victims is realized by a process of comparison between ante mortem data usually given by the families and post mortem data obtained from the examination of the bodies. The identification of disaster victims is a multidisciplinary project and the decision to grant an identity must be made among a number of relevant experts and persons; these are composed of physicians and dentists from the antemortem teams, the forensic pathologists and forensic odontologists of the post mortem teams, along with those responsible for the recovery, and different police experts involved in ante mortem and postmortem operations.<sup>5</sup>

## QUALITY ASSURANCE

Quality assurance procedures must be implemented throughout the entire identification process. The team must be multidisciplinary, organised and prepared, and must take advantage of all the different equipment and necessary materials according to the situation. It must be able to rely on psychological support at all levels. Management of a disaster should be coordinated by government authorities. The different specialists, pathologists, odontologists and others must work as a team and accept each other's expertise.<sup>4</sup>

The methods also should ensure that an advance team from a proper DVI team must be at the site as soon as possible in order to evaluate the situation and make the first and crucial decisions. The collection of antemortem information must also begin at once and is another crucial part of the DVI process. Instructions for work according to precise and validated protocols, are of utmost importance, especially when various teams involved. Computer databases and software are required as part of the tools for determining identity.<sup>4</sup>

## ADAPTING THE CURRENT DVI PLANS TO REALITY

Identification of disaster victims in Nigeria should be planned to follow the internationally accepted guidelines described above.

The Federal government and the states of the federation should without further delay put in place the process of reviewing the Coroner's system laws and providing the enabling environment for the proper forensic investigation if and when any mass disaster occurs; this includes provision of basic amenities like transport, functional mortuaries, and body bags as well as a DVI team. In Nigeria, the Coroner Law is archaic as most states of the federation have not reviewed the laws inherited from the Colonial rulers. This has hindered the proper procedure to be followed in investigating mass disasters. The old law left the responsibility of supervising these important duties in the hands of medical officers who have none or at best poor training in this field of pathology. Lagos State is the only state that has reviewed the Coroner law in 2007. Ekiti State is also in the process of reviewing the law. The reviewed Coroner system law in Lagos State married the Coroner system with the medical examiners framework. It is a hybrid of the former, Coroner system, which is British system with the latter, medical examiners system, which is essentially the American system. In this law, the Office of the Chief Medical Examiner is saddled to oversee all Forensic and Hospital autopsy cases; it is headed by a Forensic Pathologist who reports to the Chief Coroner of the State, a High Court Judge.<sup>10</sup> There is no other state

or even the federal government that has put in place an elaborate procedure for forensic investigations which are largely carried out by the few Anatomic Pathologists in the country and medical officers in some States.

The training curriculum of the first responders should be reviewed to incorporate mass disaster investigations so as to produce well trained officers and personnel. The responders (police) to scenes of crime or disaster site are poorly trained; the Police Academy curriculum does not include training in these aspects.<sup>11</sup> Other agencies like the AIB and National Emergency Management Authority (NEMA) should equally be adequately trained in DVI.

It is important to focus on the scientific aspect of this exercise and as such exclude any religious sentiments that might preclude the conduct of post mortem examination.

The government must take security issues seriously and ensure that the relevant agencies control the crowd and particularly those with intention to steal from the victims. Citizens must be properly educated on the need to give way to emergency vehicles; relevant laws should be enforced.

A functional DVI team should incorporate the different professionals and should have regular training/practice sessions. The DVI team could be assembled on *ad hoc* basis as in many countries or some members who would be involved in the regular training could be recruited on full time basis. This will ensure quick response by the DVI members whose activities would have been well spelt out during rehearsals.

Trained personnel are needed in DVI and more support staff should be trained to work in the laboratories. There is urgent need to improve on the training of Forensic Pathologists, Forensic Odontologists, Forensic Anthropologists, and Forensic Entomologists by the relevant institutions like the National Postgraduate Medical College of Nigeria, the Universities and other professional institutions.

There is also a need to develop a standard protocol for disaster management in Nigeria.<sup>2</sup> It is also important to have functional toxicological and Forensic DNA analysis laboratories in Nigeria which in the least should be located in each of the six geopolitical zones. These are necessary to aid the identification and management of the forensic autopsy cases.

## CONCLUSION

This paper has described the current practice of mass burial following mass disasters in Nigeria. It has also highlighted the global standard practice of medico-legal investigation of deaths following mass disasters focusing on DVI.

The above observations and perhaps many more summarise Nigeria's state of preparedness. It should

however be acknowledged that qualified personnel exist in Lagos State, in addition to the Lagos State Coroner system law of 2007. The recent DANA air crash and its handling by the Lagos State government with the assistance of the personnel in its employment no doubt has helped to create further awareness in addition to the personnel further sharpening their skills.

It is obvious that Nigeria is currently not fully prepared dealing with the multiple issues involved in successful forensic investigation of mass disasters. However, it is hoped that implementation of the recommendations as highlighted above will go a long way in improving the present standard of international best practices.

It is believed that the nation should be well-prepared to carry out proper investigation of mass disaster and avoid the unwholesome tradition of mass burial of disaster victims.

## REFERENCES

1. Okoye MI, Wecht CH. Introduction. In: Okoye MI, Wecht CH, editors. Forensic Investigation and Management of Mass Disasters. USA: Lawyers & Judges Publishing Company, Inc.; 2007. p. xiii-xix.
2. Obafunwa JO, Okoye MI, Nwana EJ. Recent mass disaster in West Africa: The urgent need for training forensic experts in Africa. In: Okoye MI, Wecht CH, editors. Forensic investigation and management of mass disasters. Ch. 17. USA: Lawyers and Judges Publishing Company, Inc.; 2007. p. 317-25.
3. Young WT, Okoye MI. The role of the forensic pathologist in a mass disaster. In: Okoye MI, Wecht CH, editors. Forensic Investigation and Management of Mass Disasters. Ch. 5. USA: Lawyers & Judges Publishing Company, Inc.; 2007. p. 81-9.
4. Schuliar Y, Knudsen PJ. Role of forensic pathologists in mass disaster. Forensic Sci Med Pathol 2012;8:164-73.
5. DISASTER Victim Identification Guide. Available from: <http://www.interpol.int/INTERPOL-expertise/Forensics/DVI-Pages/DVI-guide> [Last accessed on 2014 Sep 1].
6. Schuliar Y. The collection of ante mortem information after major disasters. Int Crim Police Rev 1999;474-5, 88-92.
7. Wagner GN. Aerospace pathology. In: Froede RC, editor. Handbook of Forensic Pathology. Northfield: College of American Pathologists; 1990. p. 197-204.
8. Sweet D. Forensic dental identification. Forensic Sci Int 2010;201:3-4.
9. Sweet D. Interpol DVI best practice standards — An overview. Forensic Sci Int 2010;201:18-21.
10. Lagos State Coroner law 2007. Available from: <http://www.lagoshouseofassembly.gov.ng/?in=&up=bill> [Last accessed on 2014 Jul 31].
11. Nigerian Police Academy curriculum. Available from: <http://www.npf.gov.ng/formation-list/police-academy/> [Last accessed on 2014 Sep 1].

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